

Risk Based Estimating and Management at WSDO

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peer exchange
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Overview

- *Risk Based Estimating @ WSDOT*
- *Risk Management @ WSDOT*
- *Risk Reserve Budgeting*
- *Performance measurements*
- *Best Practices*
- *Lesson's Learned*
- *Next Steps*

Why the need for Risk Based Estimating?

Improve chances of delivering project on time and within budget

Keep “the decision makers” from being surprised.

Examples of surprises:

- Significant increase in the project cost
- Significant delay of the project schedule



Bad news “let me know ASAP.”

- Significant decrease in the project cost
- Significant reduction of the project schedule



Good news “let me know as soon as you are sure about it.”

- **Improve communication between Project managers, support office managers and executives.**

WSDOT Risk-Based Estimating History

2002 WSDOT Creates CEVP®	Number of workshops and interest grows		Policy and guidance posted	Self-model tool developed	Workshop Guide posted	Project Risk Management Guide posted	Risk reserves now required for all for projects that have had a risk-based estimate	
							Expand training and Implement certification	
	2003	2004	2005	2006	2007	2008	2009	2010
CRA Workshop process scaled for smaller projects		NCHRP Report 574 Began combining VE and CRA workshops in Cost estimate process		WSDOT estimating guide provided	E 1038 Enterprise Risk Mgmt	E 1053 Risk JLARC Report	Updates to basis of estimate	Expect greater emphasis on estimate reviews and QA/QC

Estimating

- **Planning**
- **Scoping**
- **Design**
- **PS&E**

Project Development Level	Project Maturity (% of design completed)	Purpose of Estimate	Methodology	Estimate Range
<u>Planning</u> Washington Transportation Plan Highway System Plan Design Studies Route Dev. Plans	0% to 2%	Screening or Feasibility WTP/HSP (20 Year Plan) WTP – Washington Transportation Plan HSP – Highway Systems Plan	Risk-based or Judgment Historical % Similar Projects Parametric MP3 PLCE	-50% to +200%
	1% to 15%	Concept Study or Feasibility Implementation Plan (10 Yr. Plan)	Parametric MP3, PLCE Analogous Projects Historical % Risk-based CEVP CRA Self-Modeling	-40% to 100%
<u>Scoping</u> Project Summary (PD, DDS, ERS)	10% to 30%	Budget Authorization or Control Capital Improvement & Preservation Plan (CIPP)	Parametric MP3, PLCE Analogous Projects Historical bid-based (UBA, BidTabs Pro) Risk-based CEVP, CRA Self-Modeling	-30% to +50%
<u>Design</u> Design Documentation I/S Plans for Approval Design Approval	30% to 90%	Design Estimates (Project Control of Scope Schedule Budget)	Historical bid-based (UBA, BidTabs Pro, EBASE) Cost-based Risk-based CEVP CRA Self-Modeling	-10% to +25%
<u>PS&E</u> Plans, Specs, Estimate (R/W Plans approved)	90% to 100%	Engineer's Estimate (prior to bid)	Historical bid-based (UBA, BidTabs Pro, EBASE) Cost-based Risk-based Self-Modeling	-5% to +10%

Tools Needed

- Executive management support
- Effective estimating and scheduling programs
 - Estimating manual and policy
 - Scheduling software and policy
- Simple and understandable modeling tools
 - Self-modeling spreadsheet allows project managers to use it themselves which builds confidence
- Scalability of process for pessimistic managers
- Outputs that help the project manager deliver his/her project
 - One pagers
 - Risk register

Risk Based Estimate Self-Modeling

Project Title		SR 9, S. Lake Stevens Road to 20th St. SE								
Estimate Date	July 9, 2007	The yellow highlighted cells have to be filled.			Date		Variability			
Project PIN #		Target AD date	Apr-06			2%				
Last Review Date	July 16, 2007	Target End Construction Date				2%				
Project Manager	Dawn McIntoch	Estimated Construction Cost	9.25 \$M			5%				
		Base Construction Duration	7.0 Month			9 Month				
Risk Identification							Quantitative Analysis			
Priority	Status	ID #	Date Ident. Project Phase	Summary Description Threat and/or Opportunity	Detailed Description of Risk Event (Specific, Measurable, Attributable, Relevant, Timebound) [SMART]	Risk Trigger	Type	Probability (%)	Risk Impact and (Month) (\$M)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	Active		Jul-07 Design/PS&E Construction	Threat	Damage to water line(s) during construction. There are three City of Everett water lines that cross the project. The price is estimated at \$1,500/ft for the water line if impacted.		Cost	5%	MIN	0.10\$M
				MAX					1.50\$M	
				BEST GUESS					0.35\$M	
				MIN					0.0Mo	
				MAX					3.0Mo	
				BEST GUESS					1.0Mo	
2	Retired		Design/PS&E Pre-construction	Threat	Additional environmental permit requirements are needed. Mitigation issues dealing with stream relocation, fish passage issues and/or wetland impacts.		Cost	20%	MIN	0.05\$M
				MAX					1.00\$M	
				BEST GUESS					0.25\$M	
				MIN					1.0Mo	
				MAX					18.0Mo	
				BEST GUESS					4.0Mo	
3	Active		Jul-07 Design/PS&E Construction	Threat	Centennial Creek culvert(s) in worse condition than expected and require replacement during construction.		Cost	10%	MIN	0.01\$M
				MAX					0.03\$M	
				BEST GUESS					0.02\$M	
				MIN					0.0Mo	
				MAX					4.0Mo	
				BEST GUESS					4.0Mo	

Risk Management @ WSDOT

- *WSDOT requires all projects over \$10 million to use the risk based estimating process*
- *WSDOT requires all projects to have a project management plan which must include a **risk management plan***
- *Mitigation strategies are required for identified significant risks*
- *Risk reserve budgeting is required for all projects over \$10 million*

Project Management On-Line Guide

Project Management Online Guide

Pre-Construction

Construction



- [Project Description](#)
- [Team Mission/Assignment](#)
- [Major Milestones](#)
- [Boundaries](#)
- [Team Identification](#)
- [Roles/Responsibilities](#)
- [Measures of Success](#)
- [Operating Guidelines](#)

- [Work Breakdown Structure\(WBS\)/Master Deliverables List \(MDL\)](#)
- [Task Planning and Scheduling](#)
- [Budget](#)
- [Risk Planning](#)
- [Communication Plan](#)
- [Change Management Plan](#)
- [Quality \(QA/QC\) Plan](#)
- [Transition and Closure Plan](#)

- [Project Team Commitment](#)
- [Management Endorsement](#)

- [Manage the Scope, Schedule and Budget](#)
- [Manage Risks](#)
- [Manage Change](#)
- [Communicate](#)
 - Progress
 - Issues
 - Lessons Learned

- [Implement Transition Plan](#)
- [Review Lessons Learned](#)
- [Reward & Recognize](#)
- [Archive](#)

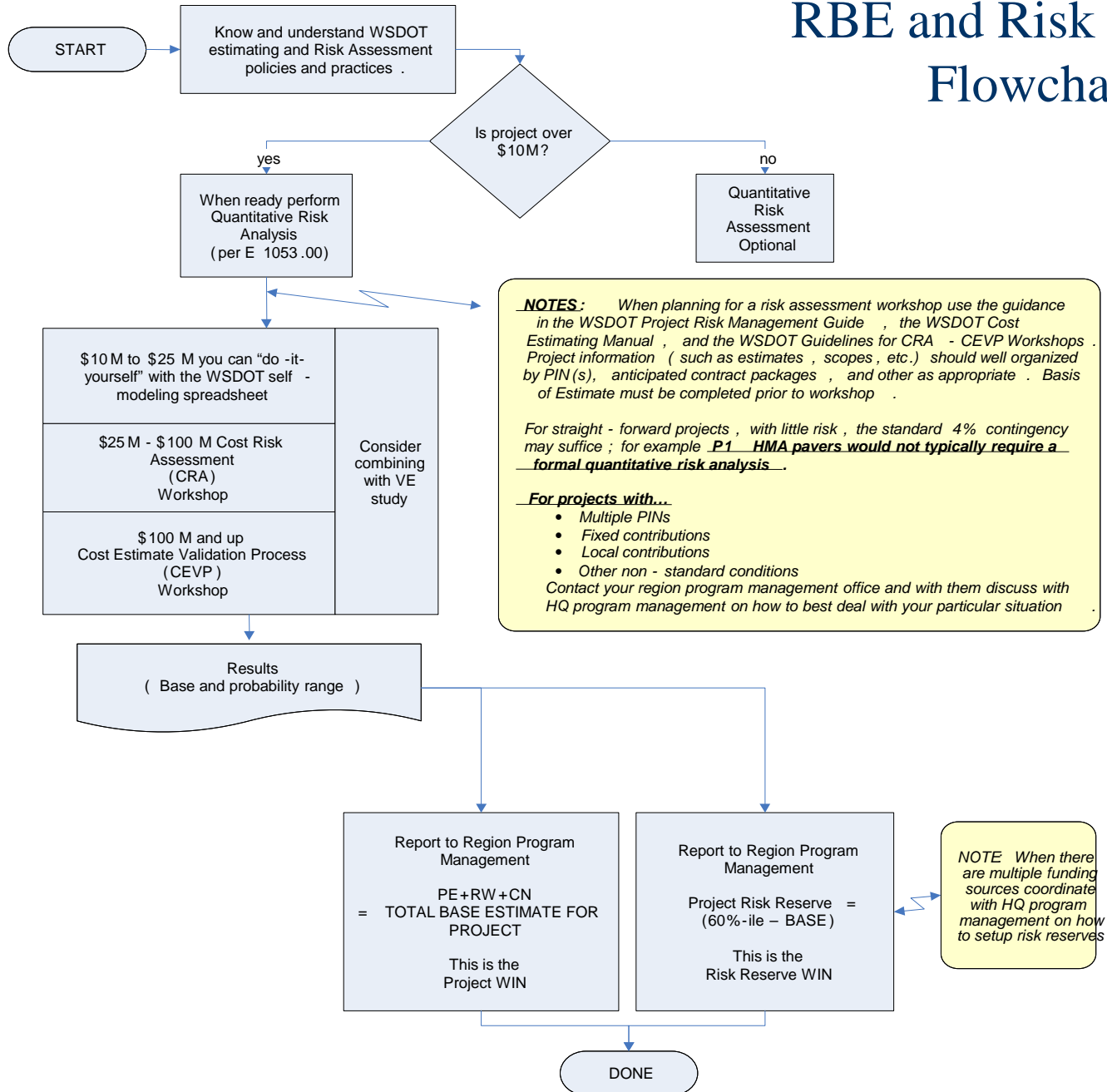
Project Budgeting

- When WSDOT started using Risk Based Estimating, most projects were funded at the 90% confidence level
 - This generous budget minimized the incentive of good risk management and many “desired things” crept into projects
 - This did not create an environment conducive to aggressive risk management

Project Budgets with Risk Reserves

- We developed a systematic approach and defined a new budget process called “risk reserve” budgeting
- We have lowered the total budget figure to the 60% confidence level (strongly recommend using the post mitigated results if available)
- The Project Manager is expected to manage the project to the estimated base cost
 - Our experience shows that typically the base cost estimate falls in the 25% to 40% confidence level

RBE and Risk Reserve Flowchart



Budget Figure using Risk Reserve

Base Cost & PM target budget & RR

Base cost includes a “ construction contingency” that the PM will use first to cover adjustments during construction.

The Risk Reserve may be used only with approval by Region Program management.

The risk reserve is monitored and as risks are retired, the amount will be adjusted.

Challenges with implementation...

- Provide opportunity for all regions to review and comment on drafts of this new policy
- Obtain upper *and* mid-level management support
- Provide implementation guidance
- Do not make it burdensome for project managers to implement
- Highlight the benefits
- Applying it to existing projects
- Allow a process for flexibility

Risk Reserve is not a “silver bullet”



Very Low probability 2%
Impact 20 \$M to 60 \$M

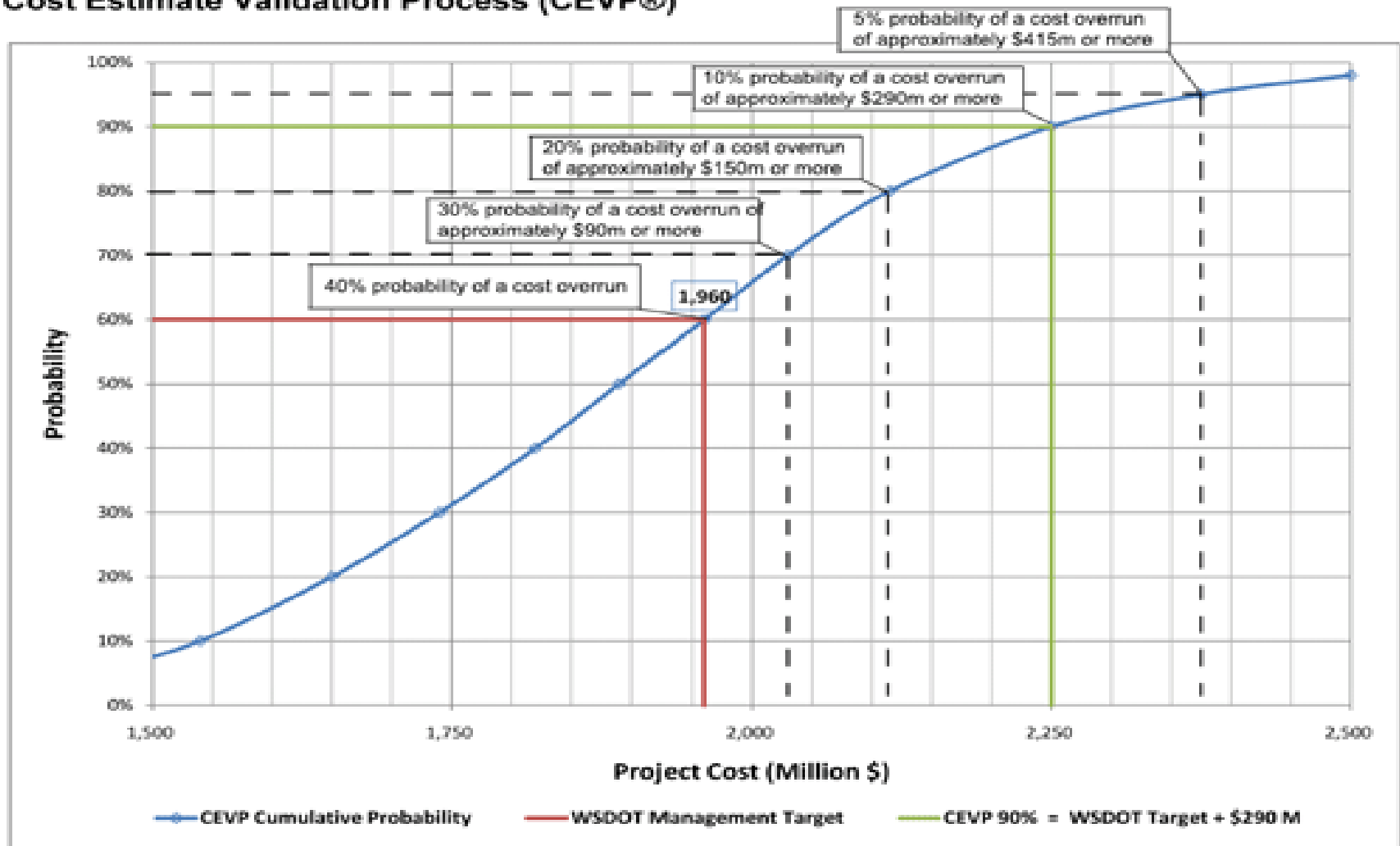


Occurred 100 \$M

Here are the headlines from the Seattle PI newspaper: **WSDOT Says: 40% Chance of Tunnel Cost Overruns**

CDM

Cost Estimate Validation Process (CEVP®)



Performance Measurement

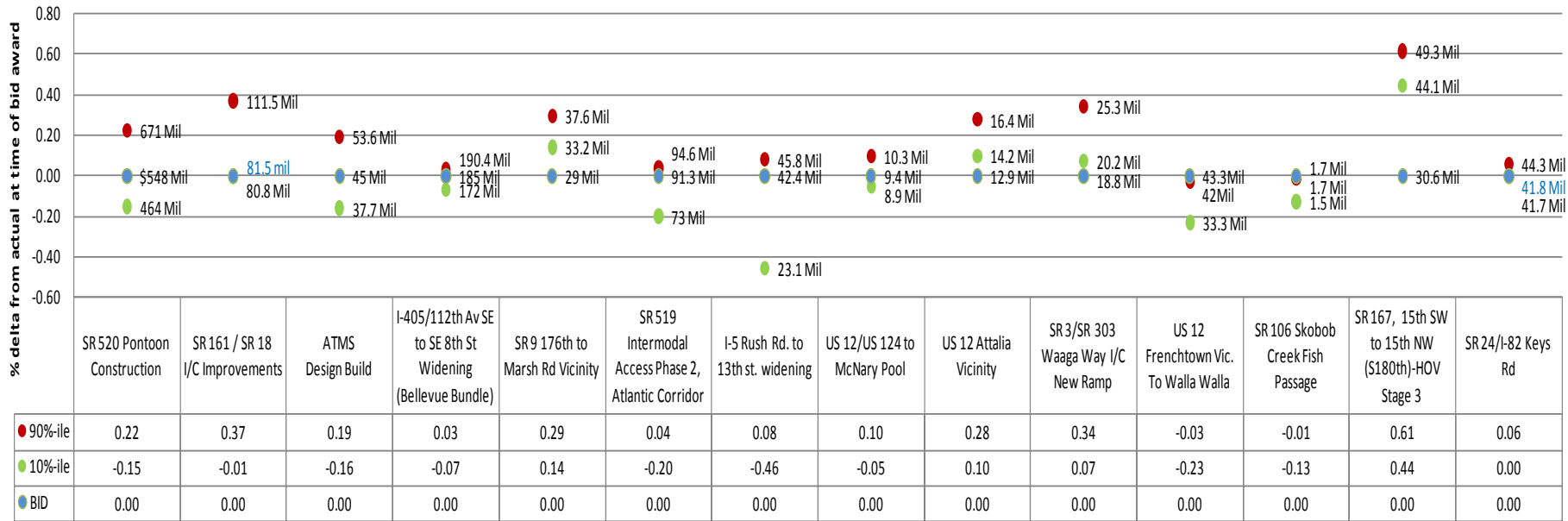
- Here are some common questions from Project managers, executives, legislature and the public:
 - Is there any value with spending the money and effort doing risk based estimating?
 - This is a lot of work why are we doing this?
 - Haven't we always been doing this?

Benefits and outcomes of RBE

- Better use of program funds
- Moves towards working within a estimate range
- More aggressive project risk management
- Tighter control of scopes
- Budgeting reflects risk and uncertainty
- More consistency
- More transparency
- Better documentation and tracking

Performance Measurement comparing costs

CEVP Range vs Actual (at time of contract award)

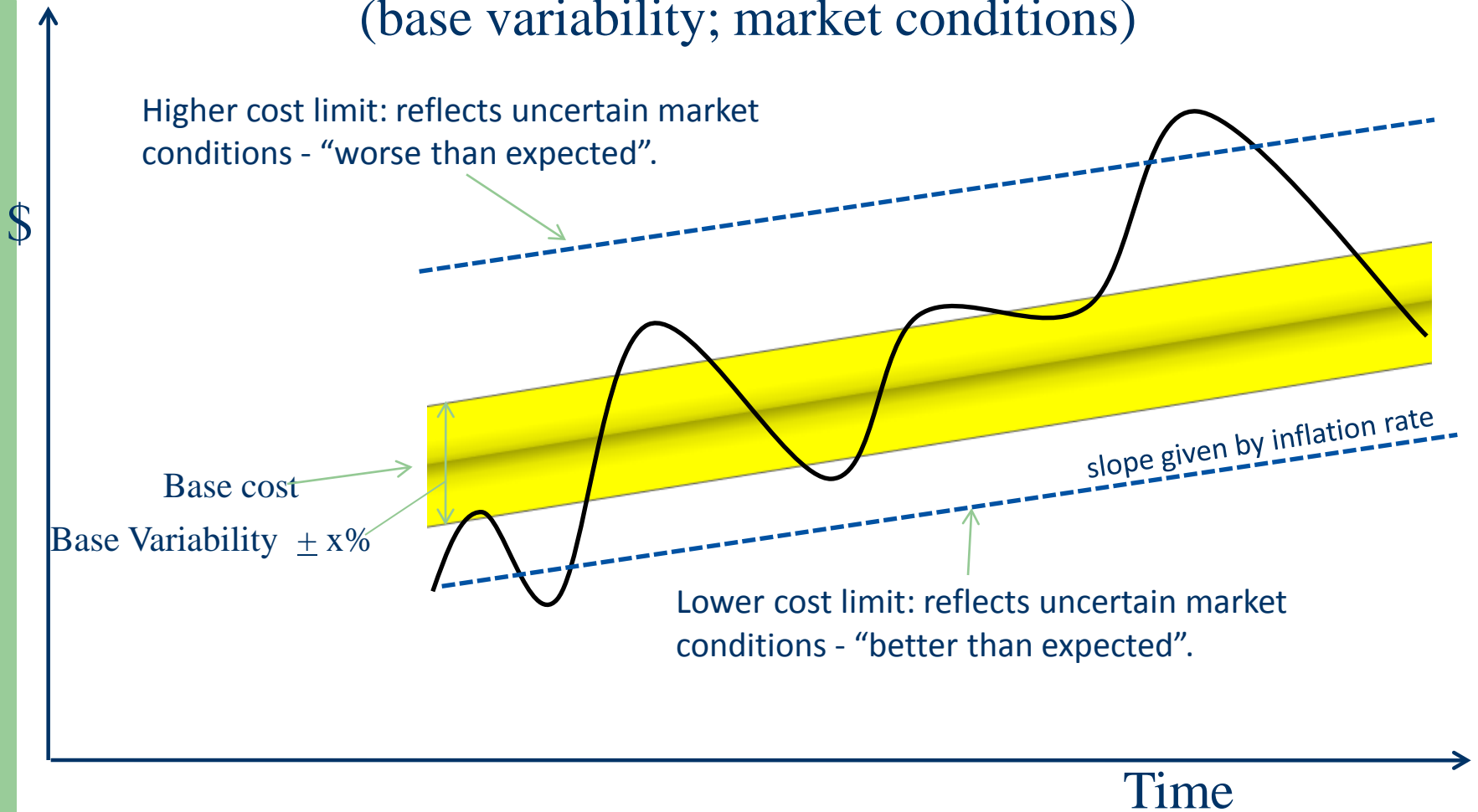


Threats to a Risk Program

- Project Managers are allowed to influence process with optimistic inputs
- Make sure you have the right people in the room at the right time.
- Don't allow discussions on inflation to occur at your workshop.
- Watch for managers creativity.
- Keep focused on significant risks.
- **Cost Estimate is not complete**
- If a workshop is not ready do not move forward with the workshop

BASE UNCERTAINTY

(base variability; market conditions)



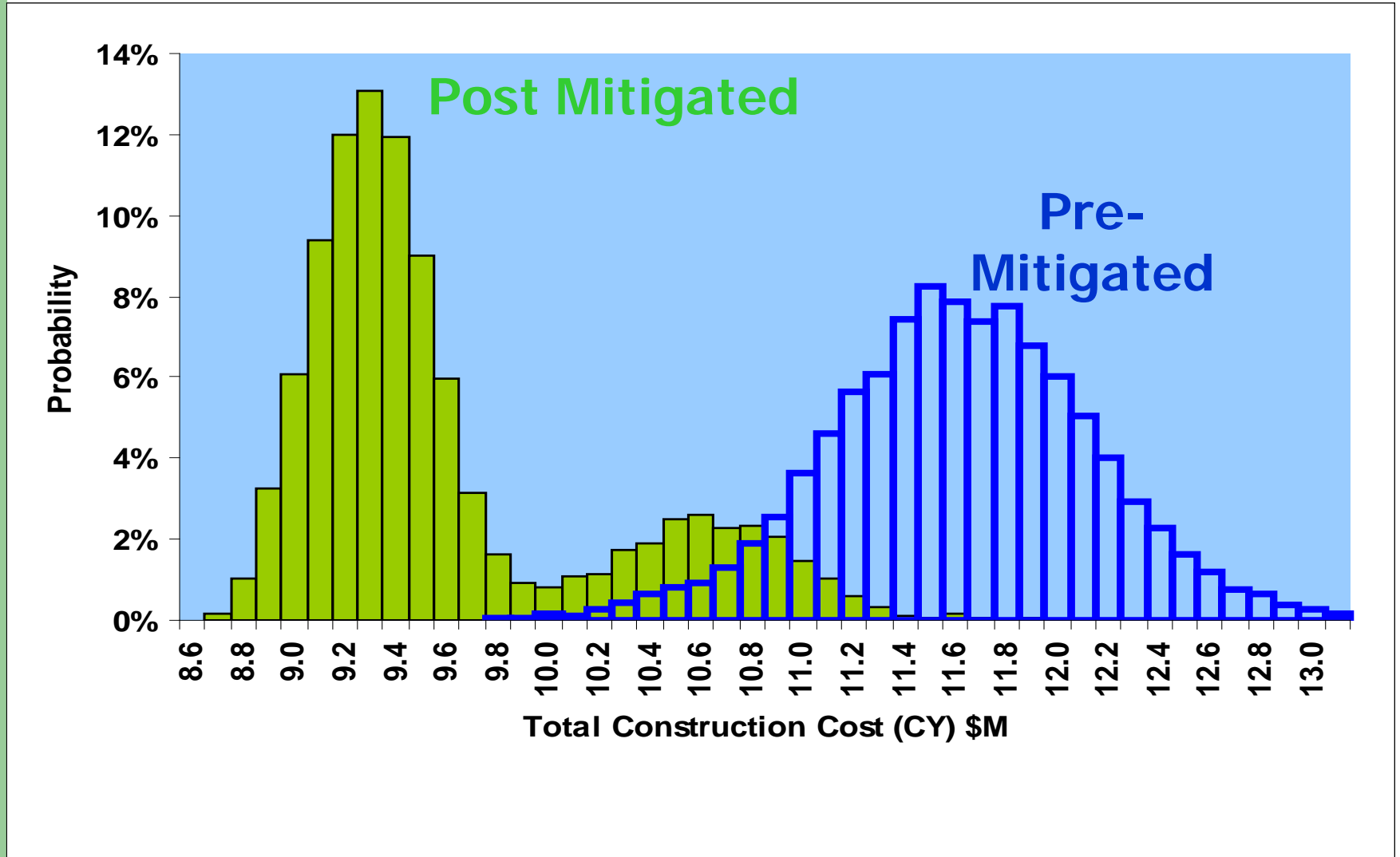
What we have learned...

- Need to have strong support from the top, and enthusiastic participation from all levels
- Have an established project management process
- Stay focused on the fundamentals (documented, well organized and developed base cost estimates)
- Use experts in the field of risk elicitation and assessment
- Adjust the process to meet the needs of project managers delivering the projects
- Develop knowledge and expertise within your organization to do QA/QC

Top Ten reasons why to implement a Risk Program

- Proactive versus reactive management
- Documented Risks and Impacts
- Ability to report the costs in ranges
- Increase in public and legislative confidence
- Educating the public about the challenges that could be encountered with project delivery
- More aggressive and effective risk management
- Cost and schedule savings
- Better understanding of the Project
- Validates cost estimate
- Validates project schedule

Range and Shape of the Pre-Mitigated vs. Post Mitigated



Contact and references

- Terry Berends, WSDOT
509.667.3041
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- [wsdot.wa.gov](http://www.wsdot.wa.gov) > cost risk assessment
<http://www.wsdot.wa.gov/Projects/ProjectMgmt/RiskAssessment/>

Questions

